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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/017,805	10/30/2001	Shun-Li Lin	JCLA7245	9164

7590 09/11/2003  
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EXAMINER

THORNTON, YVETTE C

ART UNIT PAPER NUMBER

1752

DATE MAILED: 09/11/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/017,805	<b>Applicant(s)</b> LIN ET AL.	
	<b>Examiner</b> Yvette C. Thornton	<b>Art Unit</b> 1752	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 30 October 2001.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-14 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 October 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
     If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
     a) ☒ All    b) ☐ Some \*    c) ☐ None of:  
         1. ☒ Certified copies of the priority documents have been received.  
         2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
         3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
     \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
     a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                  | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____  |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                         | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>3</u> . | 6) <input type="checkbox"/> Other: _____                                    |

### DETAILED ACTION

This is written in reference to application number 10/017805 filed on October 31, 2001 and published as US 2003/0022099 A1 on January 30, 2003.

#### *Information Disclosure Statement*

1. The Information Disclosure Statement filed on April 24, 2003 has been entered and fully considered.

#### *Priority*

2. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

#### *Election/Restrictions*

3. Applicant's election without traverse of group I, claims 1-14 in Paper No. 5 is acknowledged.
4. Non-elected claims 15-30 have been cancelled.
5. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

#### *Claim Interpretation*

6. Claims 1-14 as written contain a process limitation, which does not further limit the claimed product. Therefore, any method may be used to orient the material and the prior art is only required to be capable of being oriented to a specific direction by a physical method.

*Claim Rejections - 35 USC § 102*

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. Claims 1-14 are rejected under 35 U.S.C. 102(b) as being anticipated by Ando et al. (US 6115514 A). Ando teaches an optical waveplate which can be readily manufactured and processed. The basic concept of the present invention is to form an optical waveplate by using a polyimide having a film thickness of 20  $\mu\text{m}$  or smaller. An optical waveplate with this arrangement is formed by thermally imidizing a poly(amic acid) solution, which is synthesized from a tetracarboxylic acid or its derivative and a diamine. In this case, the formed film is subjected to uniaxial drawing or equivalent strain processing (c. 5, l. 21-29). A waveguide device is constituted by using an optical waveguide formed on a substrate and the polyimide waveplate characterized by the taught invention. As an example, a waveguide device is constituted by inserting the optical waveplate into an optical waveguide such that the waveplate is either perpendicular to or inclined from the longitudinal direction of the waveguide. Alternatively, a half waveplate is inserted into a waveguide such that the optical principal axis of the half waveplate makes an angle of 45° with a waveguide substrate (c. 5, l. 50-60). Another waveguide device characterized by the taught invention comprises a waveguide formed on a substrate and a polarization converter consisting of a polyimide optical waveplate arranged in the middle of the optical path of the waveguide. This

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polarization converter consisting of the polyimide optical waveplate converts horizontal polarization (TE mode: light having an electric field component in a plane parallel to the substrate) contained in guided light into vertical polarization (TM mode light having an electric field component in a plane perpendicular to a substrate) and vice versa (c. 5, l. 61-c. 6, l. 15). Ando performs a uniaxial drawing for films consisting of polyamic acid and polyimides, which are synthesized by combining various acid anhydrides as derivatives of tetracarboxylic acids with various diamines. Consequently, it is found that the anisotropy of a refractive index appears in the plane of a film in each and every case (c. 7, l. 1-23).

Example 4 exemplifies the use of a poly(amic acid) synthesized from PMDA and ODA. Figure 6 shows that the PMDA/ODA can achieve a  $\Delta N$  greater than 0.03 by drawing. See also figure 8. It is the examiner's position that PMDA/ODA meets the limitations of a polymer having a photosensitive section and an anti-etching section as set forth in the instant claims.

9. Claims 1-14 are rejected under 35 U.S.C. 102(b) as being anticipated by Yoshimura et al. (US 5917980 A). Yoshimura teaches the manufacture of an optical circuit device by forming an organic film on a substrate and giving this organic film non-linear optical properties (abstract). The taught organic film can be oriented by tilting the base substrate by 10-90° with respect to the direction of the projected atoms or molecules using vapor phase deposition. Further more it is preferable that the said vapor phase deposition be evaporation deposition, sputtering, MLD, MBD, MBE, ion plating or cluster ion evaporation (c. 6, l. 14-57). Figures 32a and 32b are explanatory drawings indicating one example of an optical waveguide forming process. The example is given in the case of using electron beam

deposition with SiO<sub>2</sub> as the evaporation source for the patterned thin film. Figures 33a-33d indicate a process wherein a waveguide pattern is formed with an oblique evaporation deposited film of silicon oxide. A silicon oxide thin film, formed by tilting the substrate approximately 45° in the direction of the y-axis (Fig. 32a) is used to make a base plate having a film thickness of 10 Å to 10 μ. An Si surface, Si thermal oxidized film surface or quartz surface and so forth may be exposed at portions other than the waveguide pattern, or the surface of another type of thin film, such as silicon nitride may also be exposed. Alternatively, a vertical evaporation deposited silicon oxide film formed without tilting the substrate may be exposed at portions other than the waveguide pattern. Again alternatively, a silicon oxide film formed by tilting the substrate in a direction different from the waveguide pattern portion, may also be exposed. When, for example, a gas phase reaction is carried out by introducing pyromellitic dianhydride (PMDA) and 4,4'-diaminodiphenylether (DDE) onto the said base pattern, and polyamic acid is accumulated over the entire substrate at a substrate temperature of 50°C, a polyamic acid film oriented in the direction of the y axis is selectively grown on silicon oxide, automatically forming an optical waveguide with respect to TE light (light wherein the plane of polarization is in the direction of the surface interior) (Fig. 32b). Moreover, this becomes a polyimide waveguide when this is annealed at 220°C of 1 hour. A specific example of the manufacturing of an optical waveguide according to this process is indicated in the form of the schematic drawings of figures 34a-34b. The guiding of a 0.63 μ He-Ne laser (TE light) and near infrared LD light (TE light) was confirmed for this waveguide (c. 13, l. 36-c. 14, l. 33). It is the examiner's position that the PMDA/DDE film

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meets the limitations of a linear polymer having photosensitive and anti-etching section.

DDE is structurally analogous to ODA.

*Conclusion*


10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- Lin et al. (US 2002/0160314 A1) pertaining to a method of improving astigmatism of a photoresist layer.
- Lin et al. (US 2002/0168593 B1) pertaining to a method of optical proximity correction.
- Bajikar et al. (US 6277539 B1) pertaining to enhanced adhesion for LIGA microfabrication by using a buffer layer.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Yvette C. Thornton whose telephone number is 703-305-0589. The examiner can normally be reached on Monday-Thursday 8-6:30.

12. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Janet C. Baxter can be reached on 703-308-2303. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

13. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-1495.

  
Yvette Clarke Thornton  
Junior Examiner  
Art Unit 1752

yct  
September 5, 2003